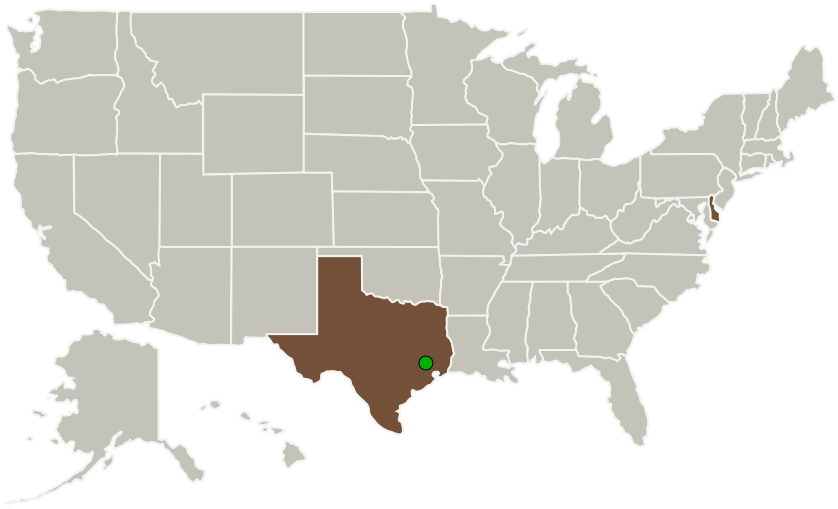
RF Front End Based on MEMS Components for Miniaturized Digital EVA Radio, Phase II

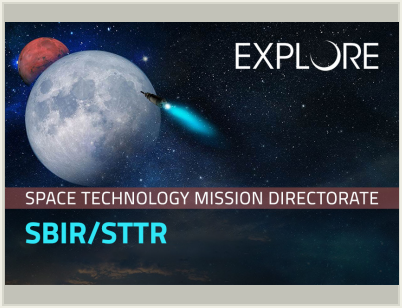
Completed Technology Project (2011 - 2013)

Project Introduction

In this SBIR project, AlphaSense, Inc. and the Carnegie Mellon University propose to develop a RF receiver front end based on CMOS-MEMS components for miniaturized digital EVA radio applications. In Phase I, we have proven the feasibility of implementing a compact, low power and high performance S band receiver front end based on CMOS- MEMS components. Specifically, we conducted link budget analysis to define the radio requirements for different applications, including low data rate voice, data/telemetry and high data rate, high definition video transceiving. We also identified and optimized the receiver front end architecture (i.e. a low-IF architecture), and analyzed its electrical performance based on known properties of individual CMOS- MEMS components. Finally, we fabricated two key components, a high quality factor MEMS band pass filter and a mixer-filter, and validated their performances. Phase II will be focusing on performance improvements of individual device and the whole receiver front end. We will also implement a fully integrated receiver based on the radio- on- a-chip solution, and characterize its performance.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
AlphaSense, Inc.	Lead Organization	Industry Women-Owned Small Business (WOSB)	Wilmington, Delaware
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
Delaware	Texas

Project Transitions

June 2011: Project Start

December 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139286)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

AlphaSense, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

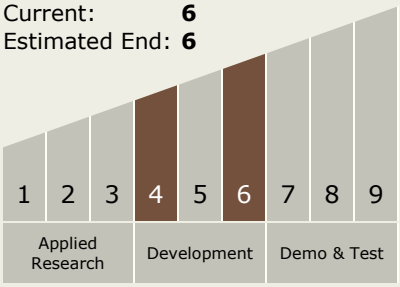
Carlos Torrez

Principal Investigator:

Xin Zhang

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



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Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.2 Radio Frequency
    - TX05.2.1 Spectrum-Efficiency

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System